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ABSTRACT

By using microcomputers, functional learning environments can be created in which reading and writing are arranged for communicative purposes and used as electronic workbooks for basic skills instruction. However, the "Computer Chronicles Newswire Network" goes a step further by giving students a goal for writing: to share their ideas and concerns with students with whom they cannot interact directly. The public nature of writing provides motivation for rewriting and editing, giving students increased knowledge of word processing and control over the composing process. By arranging learning environments in which computer-based support was gradually removed, students gained control of expository writing by gradually assuming the parts of the task initially accomplished by the computer. Dynamic support provided by the microcomputer subordinated the students' concern for the mechanics of writing to the process of writing, resulting in improved quality and fluency. (Fifteen references are attached.) (RS)

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Interactive Technology Laboratory

Report # 3

Knowledge of Text Editing
and
Control of Literacy Skills

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Report # 3
Knowledge of Text Editing
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Knowledge of Text Editing and Control of Literacy Skills

One of the most prevalent instructional applications of computer use today is for basic skills instruction (CSOS, 1982, 1983; Boruta et al, 1983; Peterson, 1983). When computers are used for basic skills instruction, students are commonly given drill and practice on material which reinforces instruction already received in their classrooms. In language arts, this computer assisted instruction (CAI) is often similar to that presented in workbooks associated with traditional reading programs. Students are presented with short lessons followed by multiple choice questions. When a correct answer is selected, the students are rewarded with a visual or musical display unrelated to lesson material.

While there is some evidence to suggest that microcomputers can deliver basic skills instruction better than conventional techniques (Kulik et al, 1983), critics of such studies (Tucker, 1983) point to the methodological problems and omissions of cost comparisons. The utility of CAI for improving students' basic skills diminishes when the high cost of computers is taken into consideration (Tucker, 1983). Furthermore, when the novelty of working with computers wears off, CAI workbook pages do not have the motivating qualities found to sustain students' interest (Malone, 1981). And, the readability and graphic quality of computerized workbooks is poorer than the printed workbook, which makes their use as a medium of communication between teacher and student questionable.

Exploiting the Full Capabilities of the Microcomputer

When considering the educational applications of microcomputers, the issue is not simply how they can be used in classrooms, but how they can be used to achieve important educational goals that could not be achieved as readily without them. Applying this criteria, it is clear that the full range and power of microcomputers are not being exploited when they are being used to drill students or provide them practice on basic skills. Therefore, it may be necessary to take Lesgold's (1983) recommendation, and ignore much of the first wave of educational software.

Now, then, can computers be used to achieve unique educational goals, specifically in the area of language arts? One way is by exploiting the interactive capabilities of microcomputers. The availability of word processors, writing tools, and computer networks makes it possible to create learning environments that go beyond drill and practice. When these learning environments are integrated with regular language arts instruction, we have found them to be extremely effective in helping students develop knowledge and control of important literacy skills.

Word Processing in Language Arts

We learn by doing, and by doing what we do over and over again. We learn to read by reading—and by reading often. We learn to write by writing -- and by rewriting and by revising what we have written. Word processing systems available on microcomputers (e.g., The Writer's Assistant: Levin et al, 1983; The Bank Street Writer, Applewriter, etc.) can facilitate the development of students' control over the reading and writing process. The screen editing,

and printing capabilities of the microcomputer can improve the production of texts by subordinating the mechanical details of writing (such as neat script and spelling) to the higher order goals of clear writing, fluency, and the flow of ideas.

However, we do not think that it is the word processor per se that is responsible for improved writing. In and of themselves, word processing systems can not solve the problem of teaching students to read and write. The blank computer screen can be just as intimidating as the blank notebook page (Levin, Boruta and Vasconcellos, 1983). While we have found that microcomputer itself cannot transform unskilled writers into skilled ones, it does present a medium that makes a new social organization for reading and writing possible. It is this social organization and not the computer alone that has positive effects on the reading and writing process.

We are finding that the microcomputer works effectively in the classroom when tasks that are organized for it are coordinated with tasks that are carried out in other parts of the curriculum. The microcomputer is most effective when it is integrated into the language arts curriculum, not treated as an isolated activity, and when it is viewed as a tool to meet educational goals, not as a teaching machine that dispenses knowledge.

The Integration of Computers and Curriculum

An important ingredient in the social organization of language arts instruction with a microcomputer involves the coordination of instruction on and off the computer. Reading and writing activities that are taught with more traditional educational tools such as paper, pencils, and blackboards

are coordinated with activities that are taught using the microcomputer as a tool for reading and writing. For example, a poetry writing activity is introduced to the whole class, and begun with paper and pencil, and then extended to the computer where a similar writing activity takes place.

Writing tools (e.g. Quill Bruce and Rubin, 1983; Interactive Text Interpreter, Levin, 1982; Compupoem) facilitate this process by increasing learners' knowledge and control of reading and writing. Writing tools provide different degrees of support or guidance, making it possible to share the initiative between writers and readers. At the more supportive end of the continuum, "readers" of structured interactive text can make simple choices of which way a story should go, or type in single words in the frame of a story or other writing activity. At the less directed end of the continuum, an interactive text or "planner" enables more skilled writers to take complete responsibility for writing, while the computer offers suggestions and provides prompts. Such writing tools make it easy for students to enter text, by providing activities which range in the degree of support, by supplying tools for spelling verification and, perhaps most importantly, by making it sufficiently easy for elementary school students to make changes in text such that they are more likely to edit their writing as a routine activity.

Creating Functional Learning Environments with Microcomputers

The social organization of language arts instruction with a microcomputer can establish functional learning environments, those in which reading and writing are organized for communicative purposes rather than just as an exercise for teachers to evaluate. Last year we tested the use of a

student newswire service known as the "Computer Chronicles" (Riel, 1983; Levin, Riel, Boruta, and Rowe, 1984) to establish functional learning environments with microcomputers in a resource room program called "The Mental Gym" with a small number of learning disabled students (Riel, 1983). This year, we are studying the use of the Computer Chronicles in four elementary school classrooms (Mehan et al, 1983).

The Computer Chronicles Newswire is a network that currently connects students from Alaska, California, Hawaii, and Mexico. Students from classrooms in each of these locations write and edit articles stored on floppy discs. The discs are mailed to all the sites participating in the network. Students at each site use the articles they have written as well as ones written by other students in the network to produce their local additions of the Computer Chronicles Newspaper.

Writing for an Audience

A crucial consequence of the use of the Computer Newswire is the creation of audiences for students' writing. Some of these are distant, and some are local.

The immediate audience (the partner) who responds to the text as it is being written is one form of local audience. The presence of this "other" during the writing process helps students generate ideas and gives immediate responses to the written text. Students frequently challenge one another's sentences as "not making any sense" or correct the spelling of a word as it was typed. Less frequently, but more importantly for the writing process, students discuss whether two sentences should be conjoined, how run-on

sentences should be divided, or how to substitute for overused words. Incomplete idea fragments produced by one of the students are often completed by the other. Research indicates that response to student's writing by peers or teachers results in significant increases in the quality of writing (Cooper, 1975; Diederich, 1974). We are finding that the immediate response of peers during the composing process provides individual help for each student that was not commonly available in other writing activities in the classroom.

When students realize that other people will read their work, not just to evaluate its form, they take control of their writing. They engage actively in revising and editing their own writing and the texts of their peers. After students write and edit their articles for the Computer Chronicles Newswire, they are submitted to a local editorial board composed of 5-8 students. These students read their articles and either accept or reject them. If accepted, their article will become part of the classroom newspaper and will be read by their family and friends. Their article is also sent over the newswire to other students. These students also review their work and decide whether to include it in their newspaper. If accepted at this level, peers and their families and friends in Alaska villages or on a Hawaii Island will read their work. This goal of writing for this distant audience is extremely effective in motivating both writing and editing.

Change in Attitude Toward Writing

Inserting the microcomputer into a functional learning environment changes students' attitude towards writing. They find purpose for both the writing and editing process. The activity of writing and editing stories for

Computer Chronicles was the most highly rated by the students in the Mental Gym program. The most remarkable difference between the writing pre- and post-test was the way the students approached the task. In the pre-test, the students needed to have the task repeatedly described and some required the constant monitoring by an adult to complete the task. In the post-test, the students sat down immediately and began writing and finished the assignment without further help. This change in attitude towards writing was noticed by the students' regular teachers as well. One of the teachers reported that after two months of participation in the Mental Gym, a student who never turned in writing assignments began to do so regularly.

In both the Mental Gym and in elementary school classrooms, students eagerly give up recess and PE to serve on editorial boards evaluating and editing articles. Serving on an editorial board is viewed by all students as a role with a very high status. In an interest survey, students from our four project classrooms listed social studies, language (grammar), spelling and writing as their least favorite subjects in that order. Yet, students are eagerly giving up top rated PE and their recess to do an activity that integrates their least favorite school subjects.

Providing Dynamic Support With Microcomputers

"Dynamic support" is a notion derived from Vygotsky's (1978) discussion of "zones of proximal development" (cf. Brown and French, 1979; Griffin and Cole, 1984). Dynamic support means providing decreasing amounts of assistance to novices learning a task. By systematically removing the assistance, novices can progress in expertise by gradually assuming the parts of the task initially accomplished by the expert. In properly arranged

teacher-student-computer environments, there is the potential for creating the kind of dynamic support that enables the learner to gain control of the process of reading and writing (Levin, 1983).

Miller-Souviney (1984) has designed a set of interactive texts which contain the feature of dynamic support to teach expository writing. There are four expository writing tasks arranged so that on each occasion of writing, the student will produce a good example of an expository essay. In the first activity, "The Sandwich Prompt," the student "makes" a unique story by choosing among options which are provided throughout the text. The next activity, "Our School Day," involves filling in words and phases as well as making choices among pre-determined options about a typical school day schedule. This prompt provides students with the beginnings of sentences and paragraphs and invites students to complete the ideas begun for them by the expository prompter.

As the students increase their writing skills, they take control of more and more of the writing task. In the third expository writing task, the students are presented with the topic of "How to Run an Apple Computer". Topic sentences for each paragraph as well as reminders of what should be contained in each paragraph are provided. The students enter their own sentences which become the introduction, body and conclusion of their essay. In the final activity in the expository writing series, students are presented with "How To..." topics to write about, but little in the way of supporting instructions. They are now responsible for producing complete texts on their own. Throughout these four activities, the goal is for the quality of the writing to remain constant while the degree of support given by the computer program decreases.

Miller-Souviney (1984) used these activities to teach expository writing to her class of 28 4th and 5th graders over a four month period. Each student received a pre- and post-test and participated in the four writing tasks. The results indicate that both writing quality and fluency improved significantly over the four month period of instruction in which dynamic support was provided by the computer programs.

The quality of the students' writing was evaluated using a holistic scoring rubric (Grubb, 1981). Pre and post writing samples were assessed by four independent scorers utilizing a 4 point scale giving a total score range of 0 to 16. The average student score on the pretest was 7.52 while the average posttest score was 10.76. Overall, there was a gain of 3.24 points between the average of the pre-test and post-test scores.

Word count data indicated an improvement in fluency rates as well. The average total word count increased by nearly 40 words and the unique word count by over 20 words between the pre- and post-tests (total/unique — pre-test 57.7/34.4; post-test 97.4/55.4; $n = 25$).

Summary

We have created functional learning environments with microcomputers in which reading and writing are arranged for communicative purposes. The "Computer Chronicles Newswire Network" gives students a goal for writing: to share their ideas and concerns with students with whom they can not interact directly. The public nature of writing provides motivation for re-writing and editing, giving students increased knowledge of word processing and

control over the composing process.

By arranging learning environments in which computer based support was gradually removed, students gained control of expository writing by gradually assuming the parts of the task initially accomplished by the computer. Dynamic support provided by the microcomputer subordinated the students' concern for the mechanics of writing to the process of writing, resulting in improved quality and fluency.

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